

rejected claims 1, 14-16, 19-21 and 31 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,043,582 (hereinafter "Cox") or U.S. Patent No. 5,619,040 (hereinafter "Shapiro);

rejected claims 17 and 18 under 35 U.S.C. § 102(e) as being anticipated by Cox;
rejected claims 2-13 and 22-30 under 35 U.S.C. § 103 as being unpatentable over Cox or Shapiro; and

objected to the disclosure because of certain informalities.

In addition, the Examiner asked for a new title that is more clearly indicative of the invention to which the claims are directed.

The Title is Sufficiently Descriptive

The title has been amended to address the Examiner's objection. The applicants respectfully submit that the new title is clearly indicative of the invention to which the claims are directed.

The Specification Complies With All Formal Requirements

The specification has been amended as requested by the Examiner to obviate the Examiner's informality objection. The applicants respectfully submit that, as amended, the specification complies with all formal requirements.

The Claims are Definite

The Office Action rejected claims 1-31 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter that applicant regards as the invention. Independent claims 1, 14 and 19 have been amended in

response to this rejection. The applicants respectfully submit that these claims, and the claims that depend therefrom, are sufficiently definite.

The Claims are not Anticipated

The claims in the application were amended solely to satisfy the definiteness rejection, above, but this amendment has an independent and unrelated benefit. Specifically, amending the claims to satisfy the definiteness rejection has the independent and unrelated benefit of pointing out that the claims are not anticipated as discussed in the Office Action.

Claims 1, 14-16, 19-21 and 31 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Cox or Shapiro, and claims 17 and 18 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Cox.

The present invention claims low-temperature solder bumps comprising lead-tin based solder having a melting point below that of eutectic lead-tin solder. (See independent claims (amended) 1, 14, 19.) Neither Shapiro nor Cox disclose lead-tin solder having a melting point below that of eutectic lead-tin solder. Instead, in Cox, indium bump bonds are connected directly from said sensing arrays to said preprocessing circuits. Similarly, Shapiro discloses a particle-detection system that uses Indium or solder bump-bonding between particle detection pixels and data acquisition pixels. Thus, because this claimed feature is missing in the cited references, it is respectfully submitted that independent claims 1, 14, 19 and are novel over the cited references.

Additionally, applicants respectfully submit that all claims that depend from these independent claims are novel at least for the reasons discussed above. With regard to claims 17 and 18, both rejected as being anticipated solely by Cox, it is respectfully submitted that this rejection is moot in light of the above discussion.

The Claims are Nonobvious

Claims 1-31 stand rejected under 35 U.S.C. § 103 as being unpatentable over Cox or Shapiro.

A. Selecting the Claimed Features is Nonobvious

The Examiner has pointed to no suggestion in the cited prior-art references to substitute for the bumps disclosed in the references with bumps of the type claimed. Rather, the Examiner states that it is within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

The applicants respectfully submit, however, that the claimed materials are not simply interchangeable with the materials used in the cited prior-art references. Rather, the claimed materials provide functions and benefits not available in the cited prior-art references.

Specifically, the use of solder bumps comprising lead-tin based solder having a melting point below that of eutectic lead-tin solder allows for self-aligning during the heating process, leading to improved accuracy and uniformity over the cited prior-art references. (See page 4, lines 4-9.) Additionally, the use of the claimed low-temperature solder avoids the need to form bumps on both the detector and readout substrates. This provides for both economies of manufacture as well as improved performance and reliabilities. (See, page 4, lines 24-29.) Additionally, the use of the claimed low-temperature solder avoids the need to form bumps on both the detector and readout substrates. This avoids a further disadvantage of the prior art, which requires the application of indium bumps to both substrates. (See Cox, col. 18, lines 50-58.)

Thus, the claimed materials provide functions and benefits not available in the cited prior-art references, and so is not an obvious substitution of equivalent materials.

Additionally, Applicants emphasize the present invention teaches avoiding the use of indium, and that there is no suggestion or motivation disclosed in the references to avoid the use of indium, or to use low-temperature solder. Regardless of a known material's suitability for an intended use, if that use is neither identified nor suggested by the prior art, then such use can not be said to be obvious.

For at least the above reasons, Applicants respectfully submit that, at least as amended, independent claims 1, 14, and 19 distinguish over the cited prior art and so are allowable. Additionally, Applicants respectfully submit that, for at least the reasons discussed above, all claims that ultimately depend from these independent claims are allowable.

CONCLUSION

In view of the amendments and remarks submitted above, the Applicants respectfully submit that the present case is in condition for allowance. A notice to that effect would be greatly appreciated.

The Examiner is invited to contact the undersigned at (202) 429-1776 to discuss any matter concerning this application.

The Office is authorized to charge any additional fees or credit any overpayments
under 37 C.F.R. § 1.16 OR 1.17 to Deposit Account No. 11-0600.

Respectfully submitted,

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By:



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